Claims

What is claimed is:

1. A turbocharger life determining system, comprising:

a turbocharger;

at least one compressor inlet pressure sensor;

at least one compressor outlet pressure sensor;

an electronic control module in communication with the sensors and including, at least part of, a turbocharger life determining algorithm; and

the turbocharger life determining algorithm being operable to determine the life of the turbocharger, at least in part, based on a relationship between the sensed compressor inlet pressure and the sensed compressor outlet pressure.

2. The turbocharger life determining system of claim 1 including at least one of an engine speed sensor, a compressor inlet temperature sensor, and a turbine inlet temperature sensor being in communication with the electronic control module; and

the turbocharger life determining algorithm being based, at least in part, on at least one of sensed engine speed, sensed compressor inlet temperature, and sensed turbine inlet temperature.

3. The turbocharger life determining system of claim 1 wherein the turbocharger life determining algorithm includes a relationship between the sensed inlet compressor pressure and the sensed outlet compressor pressure correlated to an estimated turbocharger rotational speed; and

the turbocharger life determining algorithm includes a fatigue monitoring algorithm being operable to monitor fatigue in at least one component

of the turbocharger, at least in part, by monitoring transitions in at least one sensed parameter.

4. The turbocharger life determining system of claim 1 wherein the turbocharger life determining algorithm includes a relationship between the sensed inlet compressor pressure and the sensed outlet compressor pressure correlated to an estimated turbocharger rotational speed; and

the turbocharger life determining algorithm includes a creep monitoring algorithm being operable to monitor creep of at least one component of the turbocharger, at least in part, by monitoring the relationship and at least one of compressor inlet temperature and turbine inlet temperature.

5. The turbocharger life determining system of claim 1 wherein the turbocharger life determining algorithm includes a comparing algorithm being operable to compare at least one of a monitored fatigue and a monitored creep with at least one of a predetermined fatigue criteria and predetermined creep criteria, respectively.

6. The turbocharger life determining system of claim 5 wherein the electronic control module includes the comparing algorithm; and

a turbocharger life indicator in communication with the electronic control module.

7. The turbocharger life determining system of claim 6 including at least one of an engine speed sensor, a compressor inlet temperature sensor, and a turbine inlet temperature sensor being in communication with the electronic control module;

the turbocharger life determining algorithm including a fatigue monitoring algorithm being operable to monitor fatigue of at least one component of the turbocharger, at least in part, by monitoring the engine speed, the

compressor inlet temperature, and transitions in a relationship between the compressor inlet pressure and the compressor outlet pressure;

the turbocharger life determining algorithm including a creep monitoring algorithm being operable to monitor creep of at least one component of the turbocharger, at least in part, by monitoring the relationship, the engine speed, the compressor inlet temperature, and at least one of the compressor inlet temperature and the turbine inlet temperature; and

at least one of the fatigue monitoring algorithm and the creep monitoring algorithm including a material degradation algorithm being operable to monitor material degradation in at least one component of the turbocharger, at least in part, by monitoring at least one of the compressor inlet temperature and the turbine inlet temperature.

8. An article, comprising:

a computer readable data storage medium including a turbocharger life determining algorithm; and

the turbocharger life determining algorithm being operable to determine the life of a turbocharger, in part, based on a relationship between a sensed inlet compressor pressure and a sensed outlet compressor pressure.

9. The article of claim 8 wherein the computer readable data storage medium is included within an electronic control module.

10. The article of claim 9 wherein the algorithm includes a relationship between the sensed inlet compressor pressure and the sensed outlet compressor pressure correlated to an estimated turbocharger rotational speed; and

the turbocharger determining algorithm includes a fatigue monitoring algorithm being operable to monitor fatigue in at least one component of a turbocharger, at least in part, by monitoring transitions in at least one sensed parameter.

11. The article of claim 10 wherein the turbocharger monitoring algorithm includes a creep monitoring algorithm being operable to monitor creep of at least one component of the turbocharger, at least in part, by monitoring the relationship and at least one of the compressor inlet temperature and the turbine inlet temperature.

12. The article of claim 11 wherein the relationship is based on at least one of sensed engine speed and sensed compressor inlet temperature.

13. The article of claim 12 wherein the electronic control module includes a comparing algorithm being operable to compare at least one of the monitored fatigue and the monitored creep with at least one of a predetermined fatigue criteria and a predetermined creep criteria, respectively.

14. A method of determining a life of a turbocharger comprising the steps of:

monitoring at least one of fatigue and creep of at least one component of the turbocharger, at least in part, by sensing at least one parameter correlated to an estimated turbocharger rotational speed; and

comparing at least one of the monitored fatigue and the monitored creep to a predetermined fatigue criteria and a predetermined creep criteria, respectively.

15. The method of claim 14 wherein the step of monitoring includes a step of monitoring material degradation of at least one component of the turbocharger, at least in part, by monitoring at least one of compressor inlet temperature and turbine inlet temperature.

16. The method of claim 14 wherein the step of monitoring includes a step of calculating a relationship between compressor inlet pressure and compressor outlet pressure.

17. The method of claim 16 wherein the step of monitoring includes a step of sensing at least one of engine speed, compressor inlet temperature, and turbine inlet temperature.

18. The method of claim 16 wherein the step of monitoring includes a step of monitoring transitions in the relationship.

19. The method of claim 16 including a step of indicating when at least one of the monitored fatigue and creep exceeds a predetermined fatigue data and creep data, respectively.

20. The method of claim 16 including a step of recording at least one of the monitored fatigue, the monitored creep and a calculated cumulative stress value for the turbocharger on at least one of the turbochargers, an engine associated with the turbocharger, and a database including identifying turbocharger information.